

GILMERTON, Jan. 1787.

PROSPECTUS AND PROPOSALS

FOR PUBLISHING AN

E S S A Y

TOWARDS A

NATURAL HISTORY

OF THE

MINERAL KINGDOM;

IN TWO PARTS.

PART I. Of the Natural History of the Strata of Coal, and of its concomitant Strata; to which is added, Professor Sinclair's Treatise upon Coal, published in 1662: And

PART II. Of the Natural History of the other prevailing Strata; and of the principal and most interesting Phenomena upon and within the Surface of our Globe.

By JOHN WILLIAMS MINERAL SURVEYOR,  
MEMBER OF THE SOCIETY OF SCOTTISH ANTIQUARIES.

CONDITIONS.

The Work to comprehend Two Volumes Octavo. Price  
TWELVE SHILLINGS in Boards, to be paid on delivery of the Book.

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PROSPECTUS  
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NATURAL HISTORY  
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MINERAL KINGDOM.

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**G**REAT BRITAIN receives more benefits from the bowels of the earth than perhaps any other nation under heaven; as may at once be discerned by taking a cursory view of her elegant and substantial buildings, her abundant magazines of most excellent coals, and her numerous, rich, and various mines of the precious and useful metals: and therefore a Natural History of the surface of the globe should be an acceptable present to the intelligent Briton. Coal in particular is now become of such immense consequence to our cities and populous countries, to our forges and other manufactories, that the slightest glance may convince, that it was impossible for us to arrive at such eminence, and as impossible for us to support our present flourishing state of society, without it; and we are as much indebted to the other parts of the mineral kingdom for the materials of most of our staple commodities which are so widely diffused in the numerous channels of our commerce.

There are in this island thousands, I may say millions, of useful hands employed in our mines and collieries, and in working upon our metals, and with them; which makes mineralogy uncommonly interesting at this time to the people of Great Britain, and especially to gentlemen of landed property, whose information and interest I have particularly aimed at in this work, by pointing out the real and substantial appearances of useful mineral fossils, by rejecting such as are vague and uncertain, and by guarding them against imposition from ignorance or craft.

The leading motives which induced me to write upon this subject, were utility and information. Little or nothing has yet been done towards a natural history of coal; and as little upon other parts of the mineral kingdom, tending to real information, and to throw useful light upon this great subject. I know that I am unequal to such an arduous task; especially in point of learning: however, I have the advantage of long experience, and of very extensive observation. I have spent more of my time in the mines, and among rocks and mountains, glens and precipices, than perhaps any other mineral man on earth. I have derived all my knowledge from the pure and inexhaustible sources of nature, without being in the least beholden to books, or any other help but my own observation and experience; and I have advanced nothing in this work that I cannot prove to a demonstration by local examples, the most of my work consisting of a vast collection of interesting facts and local observations, which are generally illustrated and explained by parallel examples, and such plain inferences as naturally result from the subject. I have one further view in publishing this work which I have not yet mentioned.—Britain is a great mineral country, and yet mineralogy is not taught in our universities;

universities; which I presume would be a very useful branch of learning for the sons of landed gentlemen, and for such other young men as aim at acquiring knowledge and arriving at eminence in mineral lines. Should this defect be remedied in future, and mineralogy be taught in our public schools, I have endeavoured to make ample provision for such an useful establishment. It is generally acknowledged, that natural history is the most pleasant and profitable of all human studies; and of all the parts of natural history, mineralogy is the most august and magnificent, provided we study nature itself. There is a noble air of grandeur and magnificence in the sections of lofty piles of regular strata in huge and rugged rocks and hanging precipices, in profound caverns and high cliffs of the sea, not to be found in other parts of natural history. These scenes captivate and fill the mind with great ideas. When these studies are successfully pursued, the mind is elevated, enlarged, and pleased at being able to comprehend somewhat of these great works of God. But the pleasure of these studies, however great, is nothing to the importance of them in this mining, manufacturing, and commercial country, where it may be supposed there are but few landed estates that do not contain some mineral fossil or other, which may contribute to the public good and to private interest. I wish to excite a lively sense of the importance of increasing mineral knowledge; but I fear I multiply too many words in this place. I have insisted on this topic in my Treatise, to which I refer; and will now proceed to enumerate a few of the principal contents of my work, in order to convey some idea of the nature of the performance.



Principal CONTENTS of PART FIRST.

1. Of the natural history of the strata of coal, and of the other strata which accompany coal.
2. Of the regularity, bearing, stretch, and declivity of the strata of coal, &c.—Local examples and observations.—Of sections of piles of strata, and their use for young men.—Of the bearing, continuity, slope, and parallelism of all the strata of a section.—Sundry observations below ground.
3. Of the coal troubles or accidents,
4. Of the natural history of slips and hitches.—The parallel, diagonal, and direct slips described.—A number of slips close together dangerous.—Of the use of boring to obviate such difficulties.
5. Of coal dykes.—Dykes or walls of basalt.—Whin and other hard stones.—Of softer and of imperfect stones.—Clay dykes, dykes of shingle, gravel, and of sand.
6. Of galls or gashees.—Some of them resemble the sand dykes.—Some practical hints about crossing them.
7. Of shakes.—The waving and the twisted shake.—Of the various degrees and extent of shakes.
8. Of the utility of mineral knowledge.—Youth advised to visit the collieries and coal-fields.—A number of sections and local examples pointed out for them near Edinburgh, and in many other parts of Scotland.
9. Of the proper use and improvement of sections and other observations.
10. Of the regular thickness of seams of coal.—Generally as thick at the crop as farther down.
11. Of the craw coal, a vulgar error.—The thick and thin

thin seams placed promiscuously one above another.—  
Cautions against imposition in coal trials.—Of coal roofs.  
—A variety described.

12. Of the bearing or trending of the strata.—Generally north-east and south-west in this island, or thereby.—Particular exceptions.—Of the waving and wheeling of the flat or horizontal strata.—Useful in spreading the coals wide, and keeping them floating near the surface within reach.

13. Of the coal below ground resembling the figure of the surface above.—Seldom any connection.—Local examples of coals bearing right across, diagonally across, and parallel to hills and valleys and rising grounds.

14. Of the vertical or greatly sloping coals of Gilmerston, &c. near Edinburgh, and of the horizontal coals immediately to the south of them.

15. Of the common notion that coals pass under the mountains, and emerge again, &c. a fanciful hasty error.—Proved false by local examples within less than twenty miles of Edinburgh.

16. Of the limits and boundaries of coal-fields.—Coals and other classes of strata in lesser and greater patches.—Proved by examples.—The boundaries of several coal-fields pointed out.—Several facts and examples which deserve to be investigated by others.—The limits and extent of all coal-fields in the island may be traced and pointed out.

17. Of the common opinion that the strata of coal dip down to the centre of the earth.—Examined and refuted by many instances and local examples to the contrary.—Several coals are seen to crop out or rise again to the surface on all sides of the field.

18. Of the pernicious opinion that our coals are inex-

haustible.—Disproved by inferences deduced from the foregoing investigations and examples.—Some inquiries about the first discovery of coals in this island, and about the beginning, progress, and increase of the use of coals.—Some very serious enquiries about the present state of our collieries, which deserve the attention of the legislative, manufacturing, and commercial interests of Britain; and indeed of the whole nation in general.

19. Of the coals of Cape Breton and Nova Scotia, &c. Deserve the attention of government.—The sooner they are worked the better, and why.—The advantages the nation would reap by working them to a great extent.

20. Of the appearances and indications of coal.—Fully treated of for the use of country gentlemen.—Coal itself in some form or other the most infallible appearance.—Of the disposition, bearing, and declivity of the strata of coal.—One side at least of each seam comes up to the solid surface of the earth.—Of the proper places to search for the crop or outburst of coal, and the proper ways of examining symptoms.—The true symptoms and indications of coal particularly and carefully examined.—True appearances selected and fully explained, and false and doubtful appearances examined and rejected.

21. Of the origin of coal.—Seams of coal original strata coeval with the incumbent strata and those below them.—Formed perfect at first, and not a progressive work of nature.—Antediluvian timber the origin of coal.—This topic examined and explained more fully in the second part of this work.

22. An old treatise upon coal by Geo. Sinclair professor of Mathematics in the University of Edinburgh.



## PART SECOND.

1. Of the prevailing strata of Great Britain.—Examined and fully described.
2. Of the stratified mountain rocks of whin.—Various kinds described.
3. Of argillaceous strata, a great variety.—Of schistus and slate.
4. Of granite.—Varieties of elegant red.—White, the origin of kaolin.—Kaolin, an ingredient in porcelain, where to be found in Scotland.—Grey granite.
5. Of limestone.—Fine grey and white mountain limestone.—Coarse grey.—Ash-coloured mountain-limestone of a fine texture and jagged surface.—Low-country limestones, a vast variety, of texture colour, and goodness, &c.—The limestones of the coal-fields particularly examined.—Marbles.—The white marble of affint exceeding fine.—Stone, marle, or soft limestone.—Chalk.
6. Of the micaceous mountain rock.—Its metallic appearance and strong texture.
7. Of basalts, columnar, glebous, crustated, friable, of an uniform structure.
8. Of breccia or pudding rocks.—Variety described.
9. Of quartz.—White, of a glassy texture.—Grey and stratified.
10. Of the flags of Caithness, a most excellent and useful stone.
11. Of the stratification of the superficies of the globe.—Remarks about the vast granite rocks of Lochaber.—Carngorm and crussel.—Disquisition upon stratification.
12. Of the regular strata, and of the chasms, fissures, caverns, &c.

13. Of

13. Of the mining field in the island of Isla. Described; a great curiosity, and promising.

14. Of the bearing and continuity of the strata.—Promiscuously blended as to ponderosity.—Laws of gravitation excluded from their order.

15. Of the system of Count Buffon on this subject.—Examined how it corresponds with the real structure of the superficies of our globe.

16. Of mountains and rivers.—View off summit of Bineves.

17. Of the interior structure of mountains.—Strata admirably regular in many of them, and between them, contrary to false systems.

18. Of the original formation of mountains, and of the glens and excavations.

19. Of the exterior phenomena of mountains.

20. Of the origin of rivers.

21. Of glens how scooped out.

22. Of hillocks and beds of gravel.—Where found in greatest quantity.

23. Of rocks of breccia.—Natural history of.—Immenfe rocks of it pointed out.—Origin of breccia and gravel hills the same.

24. Of the origin of islands.—The same as the glens and excavations of the mountains.

25. Of the nature, size, figure, and quality of the grains and fragments found in the composition of our rocks and strata.

26. Of talc and mica.—The fine and perfect texture and original appearance of talc.—Widely diffused.—Gives strength to stones.

27. Of

27. Of quartz and feldspat.—Also curioses, and widely diffused in the composition of our rocks.

28. Of various pure pellucid granules.—Each a perfect stone, &c.

29. Of shirl.—Its texture and original appearance.

30. Of the compound nature of our rocks and strata.—This blended condition fits them for use.

31. Of shells, coral, bones, &c. in the body of our strata.

32. Of the deluge.

33. Of some strata selected for examination; as coal and ironstone.

34. Of the origin of coal.—The antediluvian timber.—The supposed quantity of that timber and of our coals compared and found to correspond.

35. Of the natural history of peat-bog.—Its origin and increase.—Found under depths of soil accounted for.—Preserves timber, &c. long.

36. Of the deluge.—Coals, ironstone, and all the compounded rocks irrefragable proofs of it.

37. Of the antediluvian strata.—Fine, homogeneous, bright, and hard.—Proved from our fragments of them.—Not fit for the uses of society.

38. Of the breaking of the original strata, and mixing them with the waters of the deluge, and of the formation of our strata from the debris of the ancient strata.

39. Of the natural history of volcanoes, earthquakes, and volcanic eruptions.

40. Of some rules and cautions for the safety of the inhabitants of volcanic countries, in all parts of the world, which will prove effectual if properly followed and improved.

41. Of

41. Of the mountains of ice and frozen snow in the polar regions of the north.—Of the junction of the old and new continents.—The snow, &c. had a beginning.—A passage clear before the mountains of snow began to accumulate.

42. Of the exact balance and correspondence between the water contained in the accumulated ice and frozen snow, and the water propelled and driven back from the shores of the ocean by the formation of new land from the sediment of rivers.—Delta's and Belgia's in all parts of the world.—Millions of acres of land now in places formerly occupied by water.—The quantity of water now lodged in frozen snow in the polar regions, and upon the Andes and other high mountains, is immense.—The one tallies exactly with the other in respect to time and quantity.

43. Of the utility of draining putrid swamps and humid lands newly formed from the sediment of rivers, &c.

44. Of the supposed causes of the longevity of the antediluvians, and of the earliest postdiluvian inhabitants of the earth.—The quality of the air and food of the first different from ours.—A good stamina, partly the same food, and dry and elevated situations, prevented the last from falling down at once to the present standard.—The valleys being at length occupied for the conveniences of society and commerce, and rich crops, soon altered the human constitution.—Low and humid situations pernicious, and even deadly in warm countries.

45. Of deepening the beds and bars of rivers.—Great utility for navigation and commerce.—Different methods of deepening the sandy, the gravelly, and the rocky beds of rivers particularly treated of.—The immense advantages



tages to be acquired by the proposed deepening and draining.—Supposed that in that event the present number of the inhabitants of the world might be doubled.—Draining, deepening, and persflating the woods, peculiarly adapted to Africa and America.—The acquisitions to agriculture, convenience of commerce, additional health, wealth, and happiness, the whole world would enjoy in consequence of these improvements, unspeakably great.

46. Of turning great rivers on to sandy plains and deserts.—Rivers have their sources high.—If practicable to lead them on to sandy plains, and to imbank round the skirts of the sands, the winds will blow the sandy hillocks into the water; which will absorb the burning rays of the sun, cool the air, and in time produce a pleasant and profitable green sward, instead of the blowing sands.

I am fully sensible that the above essays have many and great imperfections. I am also sensible that they have two eminent perfections to balance the many faults. 1st, They are perfect in regard to truth. I have only asserted what I have seen and can shew to others. And, 2d, They contain a greater collection of facts and actual observations than ever was brought together before upon this subject. The faults are the faults of an unlettered person, without skill in the art of making books; but who wishes to be useful in laying a foundation, and in prompting others to pursue these studies, and to write more perfectly upon so great a subject.

I have begun a treatise of the natural history of mineral veins and other beds and repositories of the precious and useful metals; and if this publication meets with encouragement, I purpose finishing it: and when completed, I think it should be an acquisition to the landed Gentleman,

Gentleman, and acceptable to the intelligent naturalist and the improving miner.

I once thought of a treatise of the practice of mining and coalery; but as it would be a work of great labour, which cannot be properly executed without an expensive progress to collate every thing necessary and useful to be known at each metallic mine and coal-work visited for that purpose, many difficulties appear in my way, especially in the expence of collecting proper materials, which must be brought from the depths of our mines and coal-works, from the methods of working and bringing up the produce of them, and from the materials and machinery used, &c. I know that such a work, if well and justly executed, would be of general utility; but I do not know that I am capable of performing it as it should be done, or up to the ideas I have of such a great undertaking.

Sir,

I beg leave to recommend to your countenance  
the production of a man long acquainted  
with mining, and as every practical  
observation on an obscure subject merits  
attention particularly when it materially  
interests the publick, I have no sort  
of doubt that Mr. Williams's book  
will be useful to the Publick.

I am Sir,

with esteem

Your obed<sup>t</sup>. humble serv<sup>t</sup>.

Buchanan

Edinburgh 19.<sup>th</sup> January  
1787.

Sir Joseph Banks

from

Lord Buchan